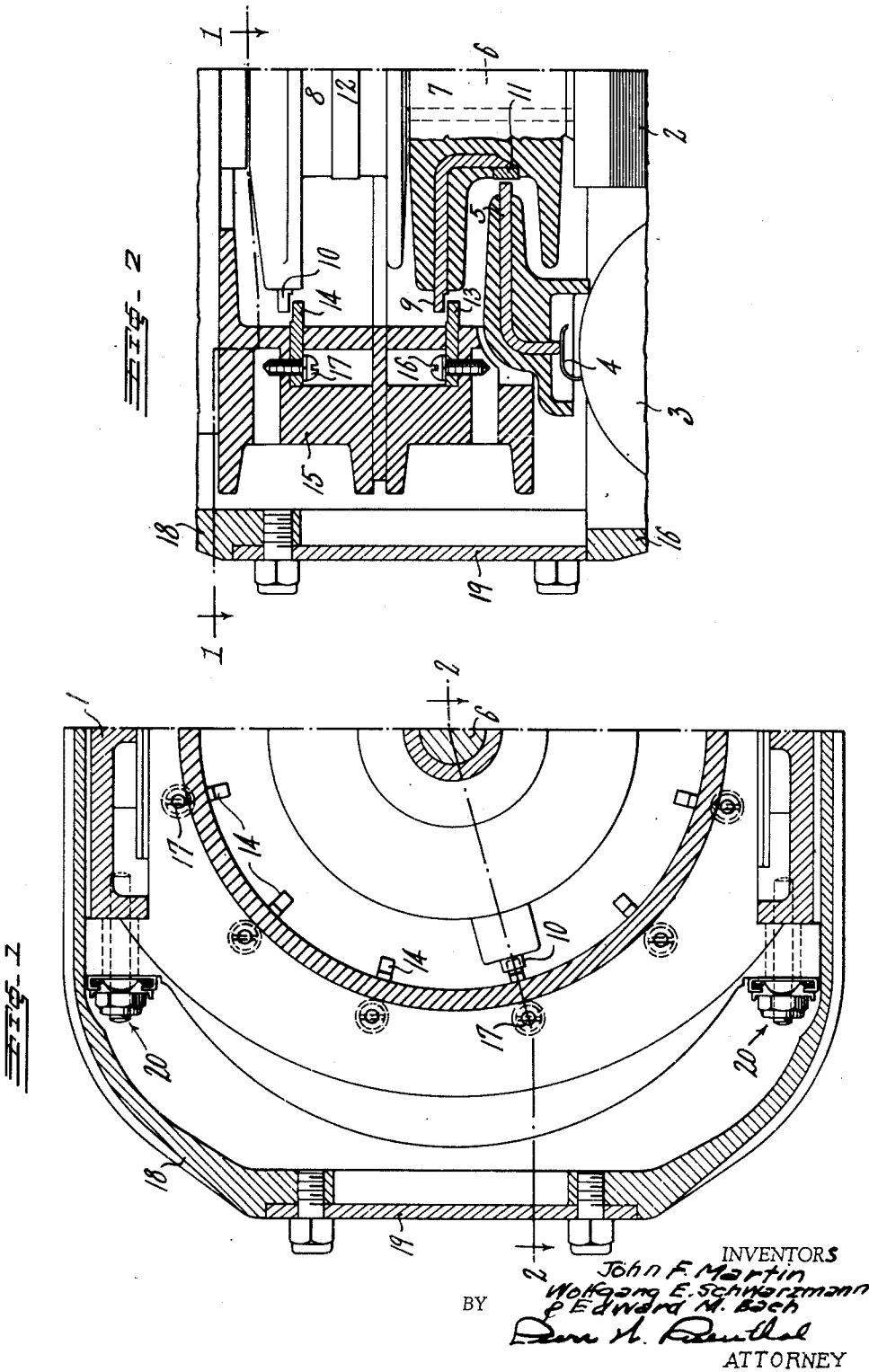


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FASTENING MEANS

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Fig. 3

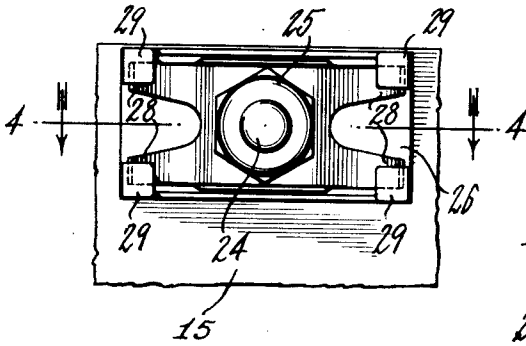


Fig. 4

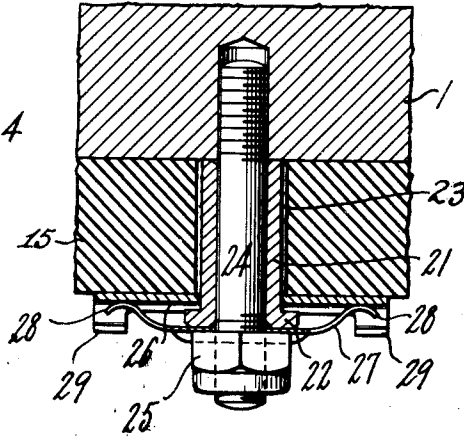


Fig. 5

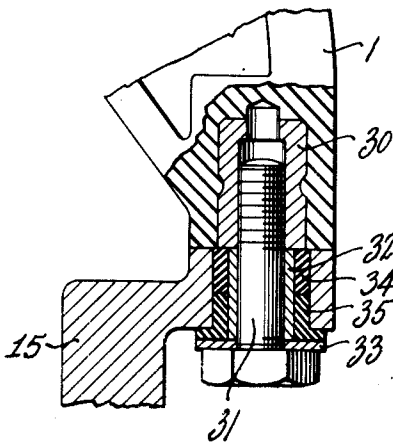
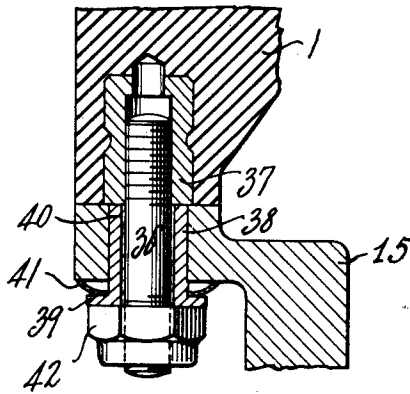


Fig. 6



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FASTENING MEANS

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7 Claims. (Cl. 85—1)

This invention relates to fastening means, and more particularly to detachable fastening means for detachably fastening an electrical insulating member to a frame, as for instance for detachably fastening the distributor plate or cap or block to the frame of an ignition generator.

Electrical insulating members are often molded from Bakelite, rubber compositions or plastic materials generally, and the frames are often cast from non-magnetic alloys as zinc or aluminum or from plastic materials. When electrical insulating members of such or other materials are rigidly fastened to frames of such metals or other materials, as by screws or bolts or otherwise, and/or when such combinations are subjected to severe vibration as on airplanes or to large temperature changes as when mounted on or near engines, the direct pressure exerted on the insulating members by the screws or bolts, or the pressure developed in the insulating members upon differential expansion and contraction between them and the frames upon temperature changes, and/or due to aging or curing, fractures have often developed in the insulating members upon assembly or reassembly thereof to the frames, or in normal operation, or after a period of time sufficient for aging or curing to occur. Such fractures often result in electrical breakdown through or along the insulating member, particularly when the insulating member forms or is associated with the distributor of an ignition generator of the high tension type. In such cases, the generator may cease operation intermittently or entirely, sometimes with serious or even fatal results in the case of airplane installations.

The primary object of the invention is to provide such fastening means as tend to eliminate the possibility of fracture of such electrical insulating members, as by cracking or breaking the member, by limiting to a substantially predetermined maximum the pressure that can be applied to the insulating member by the fastening means upon assembly or reassembly of the insulating member to the frame, and also by providing for limited movement between the member and the frame when so installed. This is accomplished by providing, as parts of the fastening means, rigid spacing means, detachable locking means, and separate resilient means, so arranged that the locking means exerts direct pressure on the frame through the spacing means and cushioned pressure of a substantially predetermined maximum amount on the insulating member through the resilient means, the resili-

ent means also providing for limited movement of the insulating member to prevent fracture thereof upon vibration, differential expansion and contraction, and/or aging and curing.

Another object of the invention is, by looseness in the fit between the fastening means and the insulating member or by the use of a rubber bushing therebetween, to provide for limited movement of the insulating member on the frame in the direction of the plane of the insulating member also.

Still another object of the invention is to provide for simplifying the attachment and detachment of the insulating member and the frame. This may be accomplished in several ways. One way is to permanently fasten in the frame the pin of the locking means to thereby more quickly and accurately position the insulating member on the frame during assembly and reassembly. Another way is to provide the rigid sleeve with a rigid head, and to arrange underneath that head a plate which lies in contact with the outer surface of the insulating member and which has interlocking means as ears for engaging the cushioning spring arranged over that head, whereby upon removal of the screw, or of the nut on the threaded end of the pin, the sleeve, plate and spring are removable and replaceable as a structural unit.

Other objects and advantages of the invention will be understood from the following description of three embodiments of the invention, in connection with the accompanying drawings, showing, as an example, the fastening means applied to a distributor member of a high tension double aviation magneto in which both the distributor member and the rigid spacer of the fastening means have smooth surface contact with the frame.

In the drawings, Fig. 1 shows in section on line 1—1 of Fig. 2, partly in plan view, a part of a magneto with one block or distributor member fastened at two places to the frame; Fig. 2 shows a vertical section on line 2—2 of Fig. 1 through a part of the magneto; Figs. 3 and 4 show, respectively, a top view and a section on line 4—4 of one embodiment of the fastening means of the invention; Fig. 5 shows, partly in section and partly in elevation, a second embodiment; and Fig. 6 shows, partly in elevation and partly in section, a third embodiment.

Referring particularly to Figs. 1 and 2, the magneto has a cast frame 1 of zinc or aluminum alloy, stator laminations 2 fastened thereto, two high tension ignition coils of which one is shown

at 3, and two insulated connectors to the high tension terminals of the respective coils of which one coil terminal 4 and one connector 5 are shown. Such a double magneto is shown generally in U. S. Patents 2,116,353, 2,116,354 and 2,160,241. The magneto rotor having the shaft 6 carries two distributor rotors 7 and 8 with projecting electrodes 9 and 10, which are continuously in gap connecting relationship through the metal rings 11 and 12 with the stationary connectors 5, and sequentially in gap connecting relationship with the stationary distributor electrodes 13 and 14 carried by a distributor block 15 of which there is a duplicate on the opposite side of the rotor. The cables (not shown) leading to the spark plugs in the engine cylinders are connected respectively to the electrodes 13 and 14 by the piercing screw connectors 16 and 17. The metal covering 18 is a part of the well known form of radio shield for the magneto, with the cable outlet and the ignition manifold junction attachment made at 19 upon subsequently installing the magneto and shielded ignition harness on the engine.

The fastening means for fastening the distributor block 15 to the frame 1 are generally shown at 20 in Fig. 1 and are of the kind disclosed in Figs. 3 and 4. The block 15 is in flat surface contact with the frame 1, and the rigid sleeve 21 of metal is of greater length than the thickness of the block at the place of passing therethrough, the sleeve extending from surface contact with the frame to a rigid outer head 22 beyond or standing away from the outer surface of the block with clearance at 23. Through this sleeve extends a threaded pin or shaft 24 permanently fixed at its inner end in the frame 1 and carrying at its outer end a self-locking nut 25. Arranged loosely between the under face of the head 22 and the block 15 is a metal plate 26, and arranged between the outer face of the head and the nut 25 is an arched spring 27 with fingers 28. Turned-over ears 29 of the plate 26 loosely interlock the fingers 28, so that the spring 27, the plate 26 and the sleeve 21 form a unitary structure upon detachment and replacement of the distributor block.

In the embodiment of Fig. 5, the insert 30 in the frame 1 is internally threaded to receive the screw 31. The rigid sleeve is in two parts comprising a cylindrical portion 32 and a washer 33 forming in effect a head on the cylindrical portion. A bushing of rubber, around the cylindrical portion 32 and underneath the washer 33 of the sleeve, is also in two parts comprising the cylindrical sleeve 34 and the capped sleeve 35. As in the previous embodiment, the block 15 is in flat surface contact with the frame 1 and the sleeve 32, 33 extends through the block from flat surface contact with the frame to a place beyond the outer surface of the block.

In the embodiment of Fig. 6, the threaded pin 36 is permanently fixed in the insert 37 of the frame 1, and the rigid sleeve 38 with its integral head 39 extends around the pin, with clearance at 40 therebetween, from surface contact with the insert to a place beyond the outer surface of the block 15. A cupped spring 41 surrounds the sleeve between the underside of the head 39 and the outer face of the block 15, and the self-locking nut 42 locks the parts in assembled position.

In all the specific embodiments herein disclosed, the pressure produced upon tightening the nut 25 of Figs. 3 and 4, and the nut 42 of

Fig. 6, and the screw 31 of Fig. 5, is exerted directly on the frame 1 through rigid parts of the sleeve 21, 22, 32, 33 or 38, 39, respectively. Since those sleeves are in contact at their inner ends with the frame and extend at their outer ends beyond the outer faces of the distributor members 15 so as to leave clearance therebetween, that pressure exerted on the distributor member is cushioned by the spring 27 of Figs. 3 and 4, and 41 of Fig. 6, and by the rubber bushing 34, 35 of Fig. 5 to a substantially predetermined maximum which depends primarily upon that clearance and the strength of the spring in its corresponding position. Thus these arrangements tend to prevent breakage of the distributor member in tightening the nut or screw or other suitable locking member of the fastening means upon installing the distributor member on the frame. At the same time the fastening means may be readily detached to remove the distributor member for examination, repair or replacement of the interior parts of the magneto.

Furthermore, by providing for the interposition of separate resilient means in the fastening means in such manner as to cushion the pressure on the distributor member as herein disclosed, the distributor member may move toward and away from the frame upon severe vibration from the engine in operation, or to compensate for differential expansion or contraction of the metal of the frame and the electrical insulating material of the distributor member, or for a change in dimensions upon ageing or curing of that insulating material. And by providing clearance, as at 23 in Fig. 4 and 40 in Fig. 6, or as a result of the compressibility of the rubber bushing 34, 35 of Fig. 5, limited movement of the distributor member on the frame is also provided in a transverse direction, to thereby provide for such movement in all directions. In this way, cracks, breakage and electrical breakdowns are generally obviated over long periods of operation.

Furthermore, by interlocking the spring 27 and plate 26 in the embodiment of Figs. 3 and 4, there is less likelihood of misplacing or losing parts of the fastening means upon disassembly thereof; and by providing the permanently fixed pins 24 and 36 this occurrence is still less likely and furthermore the distributor member is more quickly and accurately assembled in the frame.

It is apparent that many changes and modifications may be made in the specific embodiments herein disclosed without departing from this invention. For instance, suitable locking means other than screws or threaded pins with nuts may be used, and also the two may be interchanged in the embodiments disclosed. Furthermore, the springs or rubber bushings may be interposed in the fastening means in ways and locations otherwise than shown, and may have different forms, so long as the pressure of the locking means is exerted directly on the frame and is cushioned on the distributor member. Also the sleeve need not necessarily extend through the distributor member or surround the locking member or be of greater length than the thickness of the distributor member at the place of passing therethrough, in order to accomplish the results or functions herein disclosed. Such changes and modifications will be apparent to those skilled in the art and are intended to be covered by the terms of the appended claims.

Having thus described the invention, what is claimed is:

1. In combination with a frame and an electrical insulating member; detachable fastening means including: a sleeve which has a rigid shank extending at least partly through the member into contact at its inner end with the frame and which also has at its outer end a rigid head standing away from the member, separate resilient means arranged between the fastening means and the insulating member, and detachable locking means which has a shank extending through the sleeve into engagement with the frame and which exerts direct pressure on the frame through the sleeve and cushioned pressure of a predetermined maximum amount on the insulating member through the resilient means.

2. In combination with a frame and an electrical insulating member; detachable fastening means including: a sleeve which has a rigid shank extending at least partly through the insulating member into contact at its inner end with the frame and which also has at its outer end a rigid head standing away from the member, separate resilient means arranged between the fastening means and the insulating member, and detachable locking means which includes a locating pin extending through the sleeve into fixed engagement with the frame and having a threaded outer end and which also includes a nut on said threaded end to exert direct pressure on the frame through the sleeve and cushioned pressure of a predetermined maximum amount on the insulating member through the resilient means.

3. In combination with a frame and an electrical insulating member; detachable fastening means extending loosely through the insulating member and including a sleeve which has a rigid shank extending at least partly through the member into contact at its inner end with the frame and which also has at its outer end a rigid head standing away from the member, separate resilient means arranged between the fastening means and the insulating member, and detachable locking means which has a shank extending through the sleeve into engagement with the frame and which exerts direct pressure on the frame through the sleeve and cushioned pressure of a predetermined maximum amount on the insulating member through the resilient means.

4. In combination with a frame and an electrical insulating member; detachable fastening means including: a sleeve which has a rigid shank extending at least partly through the member into contact at its inner end with the frame and which also has a rigid head at its outer end standing away from the member, detachable locking means which has a shank extending through the sleeve into engagement with

the frame and which has a head exerting direct pressure on the frame through the sleeve, and a spring through which the head of the locking means exerts cushioned pressure of a predetermined maximum amount on the insulating member.

5. In combination with a frame and an electrical insulating member; detachable fastening means including: a sleeve which has a rigid shank extending at least partly through the insulating member into contact at its inner end with the frame and which also has at its outer end a rigid head standing away from the member, detachable locking means which includes a locating pin extending through the sleeve into fixed engagement with the frame and having a threaded outer end, and which also includes a nut engaged with the said threaded end to exert direct pressure on the frame through the sleeve, and a spring through which said nut exerts cushioned pressure of a predetermined maximum amount on the insulating member.

6. In combination with a frame and an electrical insulating member; detachable fastening means including: a sleeve which has a rigid shank extending at least partly through the member into contact at its inner end with the frame and which also has at its outer end a rigid head standing away from the member, detachable locking means which has a shank extending through the sleeve into engagement with the frame and which exerts direct pressure on the frame through the sleeve, a plate arranged underneath said rigid head and in contact with the outer face of the insulating member, a spring which is arranged over said rigid head and through which the locking means exerts cushioned pressure of a predetermined maximum amount on the plate, said plate having portions interlocking with the spring to hold the sleeve and plate and spring as a structural unit.

7. In combination with a frame and an electrical insulating member; detachable fastening means including: a sleeve which has a rigid shank extending at least partly through the member into contact at its inner end with the frame and which also has at its outer end a rigid head standing away from the member, a spring arranged between said rigid head and the insulating member, and detachable locking means which has a shank extending through the sleeve into engagement with the frame and which exerts direct pressure on the frame through the sleeve and cushioned pressure of a predetermined maximum amount on the insulating member through the spring.

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